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THE NATIONAL ACADEMIES

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National Academy of Sciences
National Academy of Engineering
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National Research Council

March 2, 2001

Ms. Magalie Roman Salas, Esq.
Secretary
Federal Communications Commission
(Delivered to TW-A325, 12th Street lobby)
The Portals
445 Twelfth Street, SW
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems	)	ET Docket No. 00-258
	)	
Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Implementation of WRC-2000: Review of Spectrum and Regulatory Requirements for IMT-2000	)	RM-9920
	)	
Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/2670-2690 MHz Frequency Bands for the Mobile-Satellite Service	)	RM-9911

Dear Ms. Salas:

Transmitted herewith by the National Academy of Sciences, through the Committee on Radio Frequencies of the National Research Council, are an original and five copies of its Motion to File Late and Comments in the above-referenced proceedings.

If additional information is required concerning this matter, please communicate with this office.

Sincerely yours,

Joel Parriott
Program Officer

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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MOTION TO FILE LATE AND COMMENTS OF THE
NATIONAL ACADEMY OF SCIENCES'
COMMITTEE ON RADIO FREQUENCIES

The National Academy of Sciences, through the National Research Council's Committee on Radio Frequencies (hereinafter, "CORF"),[1] hereby submits its Comments[2] in response to the Commission's January 5, 2001, Notice of Proposed Rulemaking in the above-captioned docket ("NPRM"). In these Comments, CORF supports the proposal in Appendix F (modified as set forth below) of the NPRM to provide protection to certain facilities used in the Radio Astronomy Service ("RAS") against interference from fixed and mobile users in the 1710-1755 MHz band.

[1] A roster of the committee membership is attached.

[2] CORF hereby moves for leave to file these Comments after the filing deadline. CORF believes that this late filing will not prejudice any parties, since there is still significant time for such parties to review and comment on the matters set forth herein. Most importantly, CORF believes that these Comments contain significant and substantial information that will contribute to reasoned decision making in this proceeding.

I. Introduction: The Importance of RAS Observations in the 1.7 GHz Bands, and the Unique Vulnerability of Passive Services to Out-of-Band and Spurious Emissions

CORF has a substantial interest in this proceeding because it represents the interests of the scientific users of the radio spectrum, including users of the RAS bands. RAS observers perform important yet vulnerable research.

As the Commission has long recognized, radio astronomy is a vitally valuable tool used by scientists to study our universe. Through the use of radio astronomy, scientists have in recent years made the first discovery of planets outside the solar system, circling a distant pulsar. Measurements of radio spectral line emission have identified and characterized the birth sites of stars in our own galaxy, and the complex distribution and evolution of galaxies in the universe. Radio astronomy measurements have revealed ripples in the cosmic microwave background, generated in the early universe, which later formed the stars and galaxies we see today. Observations of supernovas have witnessed the creation and distribution of heavy elements essential to the formation of planets like Earth and of life itself.

These current benefits of this scientific research, obtained through years of work and substantial federal investment, as well as future benefits, must be protected. Other branches of ground- and space-based astronomy and physics often rely on the results of radio astronomy to make progress. Furthermore, the U.S. research investment in radio astronomy is part of a wider set of U.S. and international research interests. A scientific constituency far broader than radio astronomers will be affected without protection for radio astronomy.

As passive users of the spectrum, radio astronomers have no control over the frequencies that they must use for their observations or over the character of the "transmitted" signal. These parameters are set by the laws of nature. Furthermore, the emissions that radio astronomers receive are extremely weak—a typical radio telescope detects only about one-trillionth of a watt from even the strongest cosmic source and routinely detects sources even one million times weaker than that. Because radio astronomy receivers are designed to pick up such remarkably weak signals, such facilities are particularly vulnerable to interference from spurious and out-of-band emissions from licensed and unlicensed users of neighboring bands, and from those that produce harmonic emissions that fall into the RAS bands.

Of particular concern in this proceeding is protection of RAS observations in the 1.7 GHz bands. Observations of the hydroxyl radical (OH) are widely conducted in the frequency range between 1718-1722 MHz. Emissions from this molecule are detected by high-resolution techniques, such as VLBI (very long baseline interferometry). Such techniques have made it

possible to image maser sources in protostellar clouds, giving unique insights into the origin and evolution of stars. Also, by simultaneously measuring the emission from the OH line at 1720 MHz and 1667 MHz, it is possible to identify the density of interstellar clouds. Indeed, the International Telecommunication Union's Handbook on Radio Astronomy (Geneva, 1995) lists the OH line at a rest frequency of 1720.530 MHz as one of the radio-frequency lines of greatest importance to the RAS. (Id. at Table 2, page 13.) Recently, new and widespread maser emission detected at 1720 MHz has been found near supernova remnants. These sources indicate that new discoveries and new classes of objects can still be detected in regions of the radio spectrum thought to be "well-known." Because of the range of Doppler shifts possible from these various emitters, protection for radio telescopes is necessary in the 1718-1722 MHz range.

In sum, observations in the 1710-1755 MHz band at issue in this proceeding are extremely important yet, like all passive scientific observations, are uniquely vulnerable to interference from out-of-band and spurious emissions. Accordingly, protection from harmful interference to RAS facilities that observe in this band would serve the public interest.

II. CORF Supports the Proposed Protection of Certain Observatories, But Suggests That the List Be Modified.

CORF supports the proposal, in Appendix F (modified as set forth below) of the NPRM, to protect certain observatories listed therein, by the specification of certain geographic zones surrounding those observatories. Such an approach is consistent with the requirements of Footnote US 256. CORF recommends that if the 1710-1755 MHz band is allocated to non-government mobile services, that the license areas for such services exclude the protected zones listed in Appendix F. Such an approach should not be significantly burdensome to advanced mobile service licensees, as the protected areas are small and distributed reasonably evenly around the United States.

With regard to allocation to new non-government fixed services, CORF recommends the use of mandatory coordination procedures similar to those already enacted in Sections 1.924(a) and 1.924(d) of the Rules. While protection of the National Radio Astronomy Observatories' (NRAO) facility at Green Bank, West Virginia, and the National Astronomy and Ionospheric Center's observatory at Arecibo, Puerto Rico, could be accomplished merely by making fixed licensees in the 1710-1755 MHz band explicitly subject to Sections 1.924(a) and 1.924(d), this approach would not suffice for protection of the other observatories listed in Appendix F. Accordingly, the Commission should enact a new rule Section (perhaps as a new part of Section

1.924) providing for coordination procedures for applications proposing fixed uses in this band within 160 kilometers of the observatories set forth in Appendix F. (Cf. Section 25.213(a)(1) of the Rules.)

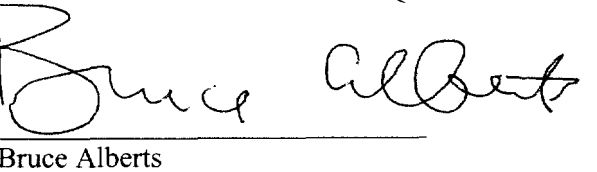
Notwithstanding the language of Footnote US 256, CORF suggests that the Haystack observatory be deleted from Appendix F, since it no longer performs observations in the 1.7 GHz bands. The sites listed in Footnote US 311 for NRAO's Very Large Array at Socorro, New Mexico, and Very Long Baseline Array Stations should be added because significant observations in the 1.7 GHz bands are regularly made at those sites. Likewise the Goldstone observatory in California should be added; its coordinates are 35° 25.6′ north latitude and 116° 53.4′ west longitude.

III. Conclusion.

CORF supports the proposal in Appendix F (modified as set forth above) of the NPRM to provide protection to certain RAS facilities against interference from non-government fixed and mobile users in the 1710-1755 MHz band.

Respectfully submitted,

NATIONAL ACADEMY OF SCIENCES'
COMMITTEE ON RADIO FREQUENCIES

By: 

Bruce Alberts
President

March 2, 2001

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